

**Final**

**Remedial Investigation**

**Site-Specific Field Sampling Plan Addendum  
Small Weapons Repair Shop, Parcel 66(7)**

**Fort McClellan  
Calhoun County, Alabama**

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# Table of Contents

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## Page

List of Tables.....	ii
List of Figures .....	iii
List of Acronyms .....	iv
1.0 Introduction .....	1-1
2.0 Summary of Site Investigation .....	2-1
2.1 Environmental Sampling.....	2-1
2.1.1 Surface Soil Sampling.....	2-1
2.1.2 Subsurface Soil Sampling .....	2-2
2.1.3 Groundwater Sampling .....	2-2
2.1.4 Water Level Measurements.....	2-2
3.0 Proposed Field Activities .....	3-1
3.1 Utility Clearances.....	3-1
3.2 Environmental Sampling.....	3-1
3.3 Residuum Monitoring Wells .....	3-1
3.4 Bedrock Monitoring Wells.....	3-2
3.5 Groundwater Sampling .....	3-3
3.6 Temporary Well Abandonment.....	3-3
3.7 Slug Tests .....	3-3
3.8 Surveying of Sample Locations.....	3-4
3.9 Investigation-Derived Waste Management .....	3-4
3.10 Site-Specific Safety and Health.....	3-4
4.0 Project Schedule .....	4-1
5.0 References .....	5-1
Attachment 1 - List of Abbreviations and Acronyms	

## **List of Figures**

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<b>Number</b>	<b>Title</b>	<b>Follows Page</b>
1-1	Site Location Map, Small Weapons Repair Shop, Parcel 66(7)	1-1
1-2	Site Map, Small Weapons Repair Shop, Parcel 66(7)	1-2
1-3	Groundwater Elevation Map, March 13 and 14, 2000, Small Weapons Repair Shop, Parcel 6(7)	1-2
2-1	Sample Location Map, Site Investigation 1999, Small Weapons Repair Shop, Parcel 66(7)	2-1
2-2	Soil and Groundwater Sample Locations Exceeding Residential Human Health SSSLs	2-2
3-1	Proposed Monitoring Well Locations, Small Weapons Repair Shop, Parcel 66(7)	3-1

## ***List of Acronyms***

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See Attachment 1, List of Abbreviations and Acronyms.

## **1.0 Introduction**

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The Small Weapons Repair Shop, Parcel 66(7), was investigated as part of the site investigation (SI) conducted for the Former Ordnance Motor Repair Area, Parcel 75(7), Fort McClellan (FTMC), Calhoun County, Alabama.

The Small Weapons Repair Shop, Parcel 66(7) (Figure 1-1), was identified as an area to be investigated prior to property transfer. The area was identified as a Category 7 site in the environmental baseline survey (Environmental Science and Engineering, 1998). Category 7 sites are areas that are not evaluated and/or require further evaluation. A site-specific field sampling plan (SFSP) attachment and a site-specific safety and health plan (SSHP) attachment were finalized in December 1998 (IT Corporation [IT], 1998a) to address field activities associated with the SI. The SI for the Former Ordnance Motor Repair Area included field work to collect three surface soil samples, three subsurface soil samples, and three groundwater samples in the vicinity of the Small Weapons Repair Shop. The SI was performed to determine whether potential site-specific chemicals were present at concentrations that would present an unacceptable risk to human health or the environment. The SI analytical results were compared to human health site-specific screening levels (SSSL), ecological screening values (ESV), and background screening values for FTMC. The SSSLs and ESVs were compiled by IT as part of the human health and ecological risk evaluations associated with SIs being conducted under the Base Realignment and Closure Environmental Restoration Program at FTMC. Vinyl chloride (0.037 milligrams per liter [mg/L]), 1,1-dichloroethane (0.0018 mg/L), and cis-1,2-dichloroethene (0.021 mg/L) were detected in the groundwater sample collected from temporary well PPMP-75-GP01 at concentrations exceeding residential human health SSSLs. Based on the comparisons of the analytical data to the SSSLs, a remedial investigation (RI) is required to determine the horizontal and vertical extent of groundwater contamination.

Specifically, IT will collect 13 groundwater samples from 13 monitoring wells. Groundwater samples collected during the RI field program will be analyzed for volatile organic compounds (VOC). Analytical data from these samples will be compared to the SSSLs to determine if chemical constituents are present at concentrations requiring further cleanup action by the Army prior to transfer.

This addendum to the SFSP attachment will be used in conjunction with the SSHP, the installation-wide work plan (IT, 1998b), and installation-wide sampling and analysis plan (SAP)

(IT, 2000). The SAP includes the installation-wide safety and health plan, waste management plan, and quality assurance plan. Site-specific hazard analyses are included in the SSHP.

This addendum to the SFSP attachment for FTMC has been prepared to provide technical guidance and rationale for sample collection and analysis at the Small Weapons Repair Shop, Parcel 66(7) (Figure 1-2). IT will collect samples at this site as part of a RI effort. The purpose of the RI is to define the horizontal and vertical extent of chlorinated compounds in groundwater, specifically, vinyl chloride. The groundwater elevation data is provided in Figure 1-3 and Table 1-1.

Table 1-1

**Groundwater Elevation Data**  
**March 13 and 14, 2000**  
**Site Investigation, 1999**  
**Small Weapons Repair Shop, Parcel 66(7)**  
**Fort McClellan, Calhoun County, Alabama**

(Page 1 of 2)

Temporary Well	Ground Elevation (ft-msl)	TOC Elevation (ft-msl)	Groundwater Elevation (ft msl)
PPMP-75-GP01	783.59	782.78	781.63
PPMP-75-GP02	782.11	781.98	779.18
PPMP-75-GP03	781.49	781.34	779
FTA-131-GP02	791.36	793.21	790.2
FTA-149-GP01	772.87	773.58	770.19
FTA-149-GP02	770.66	773.28	768.58
FTA-149-GP04	773.83	775.68	771.55
FTA-149-GP07	781.95	784.41	774.72
FTA-149-GP12	788.04	789.93	783.68
FTA-149-GP13	782.32	784.57	779.86
FTA-164-GP01	799.55	801.39	796.51
FTA-164-GP02	807.51	810.05	804.04
FTA-164-GP03	807.16	807.26	805.75
FTA-164-GP04	800.54	802.1	796.35
FTA-164-GP05	812.26	813.63	808.46
FTA-164-GP06	817.22	819.14	814.77
FTA-164-GP07	812.67	813.57	806.96
FTA-164-GP10	803.08	805.79	798.9
FTA-164-GP11	799.96	801.59	798.11
FTA-164-MW01	813.74	813.535	809.385
FTA-164-MW02	814.03	813.73	809.41
FTA-164-MW03	814.62	814.305	810.045
FTA-166-GP01	767.92	768.38	767.88
FTA-166-GP02	768.06	767.92	767.12
FTA-170-MW01	790.095	789.874	783.134
FTA-170-MW02	790.677	790.485	783.205
FTA-170-MW03	786.03	785.854	781.324
FTP-77-GP01	789.56	789.66	783.46
FTP-77-GP02	787.78	789.79	780.96
FTP-77-GP03	787.78	788.77	780.3
PPMP-75-GP01	783.59	782.78	781.63
PPMP-75-GP02	782.11	781.98	779.18
PPMP-75-GP03	781.49	781.34	778.99
PPMP-75-GP04	782.71	782.25	778.94
PPMP-75-GP05	781.92	782.36	779.01
PPMP-75-GP07	782.62	782.87	778.92
PPMP-75-GP08	788.75	791.15	783.96
PPMP-75-GP09	788.38	790.61	782.17
PPMP-75-GP10	787.29	787.24	782.74
PPMP-75-GP12	788.47	788.12	784.97
PPMP-75-GP13	786.49	785.7	783.19
PPMP-75-GP21	782.6	782.2	779.4
PPMP-75-GP23	783.53	784.51	781.14
PPMP-75-GP24	784.13	783.96	781.44
PPMP-75-GP25	785.41	784.91	781.37
PPMP-75-GP27	784.61	784.45	780.17
PPMP-75-GP28	785.61	785.3	782.33
PPMP-75-GP30	789.16	789.59	786.73
PPMP-75-GP50	793.73	795.33	791.56

**Table 1-1**

**Groundwater Elevation Data  
March 13 and 14, 2000  
Site Investigation, 1999  
Small Weapons Repair Shop, Parcel 66(7)  
Fort McClellan, Calhoun County, Alabama**

(Page 2 of 2)

<b>Temporary Well</b>	<b>Ground Elevation (ft-msl)</b>	<b>TOC Elevation (ft-msl)</b>	<b>Groundwater Elevation (ft msl)</b>
PPMP-75-GP55	801.653	803.493	791.643
PPMP-75-GP68	779.61	779.5	779.09
PPMP-75-GP69	788.77	791.32	787.05
PPMP-75-GP73	777.74	779.42	774.91
PPMP-75-GP75	784.75	784.86	782.43
PPMP-85-GP01	800.06	801.59	790.15
PPMP-85-GP02	800.82	801.53	797.43
PPMP-85-GP03	797.76	798.71	785.91
PPMP-85-GP04	796.07	798.25	790.07
PPMP-85-GP05	798.1	800.56	793.53
PPMP-85-GP09	801.75	804.54	784.73
UST-39-MW01	788.321	790.523	781.953
UST-39-MW02	795.109	797.183	784.253
UST-39-MW03	803.174	802.462	791.832
UST-43-MW02	808.069	810.243	800.563
UST-43-MW03	805.932	808.314	804.024
UST-9-MW01	763.702	763.441	761.101

Elevations referenced to the North American Vertical Datum of 1988 (NAVD88).  
ft- feet.

msl- Mean sea level.

TOC-Top of casing.





## **2.0 Summary of Site Investigation**

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This section summarizes the SI activities conducted by IT at the Small Weapons Repair Shop, Parcel 66(7), including the environmental sampling and analysis and monitoring well installation activities.

### **2.1 Environmental Sampling**

The environmental sampling performed during the SI at the Small Weapons Repair Shop, Parcel 66(7), included the collection of three surface soil samples, three subsurface soil samples, and three groundwater samples for chemical analysis. The sample locations were determined by the on-site geologist based on the sampling rationale, presence of surface structures, site topography, buried and overhead utilities, observing site physical characteristics noted during a site visit, and by reviewing historical documents pertaining to activities conducted at the site. Analytical results were compared to residential human health SSSLs, ESVs, and background screening values (metal, and semivolatile organic compounds [SVOC]), as presented in Tables 2-1 through 2-3. Sample locations are presented on Figure 2-1.

#### **2.1.1 Surface Soil Sampling**

Three surface soil samples were collected from three locations at the Small Weapons Repair Shop, Parcel 66(7). Surface soil samples were collected from the upper 1 foot of soil at the locations shown on Figure 2-1. As shown on Table 2-1, three VOCs and four SVOCs exceeded residential human health SSSLs. However, the metals and SVOCs were within background concentrations.

**Metals.** The concentrations of aluminum (two locations), arsenic (three locations), and iron (three locations) exceeded residential human health SSSLs. However, these samples were within background concentrations.

**Semivolatile Organic Compounds.** Four SVOCs, including benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene, were detected at concentrations exceeding residential human health SSSLs. However, all four SVOCs were within background concentrations. Sample location PPMP-75-GP01 contained all four of the detected SVOCs.

Table 2-1

**Summary of Surface Soil Analytical Results**  
**Site Investigation, 1999**  
**Small Weapons Repair Shop, Parcel 66(7)**  
**Fort McClellan, Calhoun County, Alabama**

Parcel Number Sample Location Sample Number Sample Date Sample Depth (ft)					PPMP-75 PPMP-75-GP01 KJ0001 18-Jan-99 0-1					PPMP-75 PPMP-75-GP02 KJ0005 18-Jan-99 0-1					PPMP-75 PPMP-75-GP03 KJ0007 18-Jan-99 0-1				
Parameter	Units	Bkg <sup>a</sup>	SSSL <sup>b</sup>	ESV <sup>b</sup>	Result	Qual	>Bkg	>SSSL	>ESV	Result	Qual	>Bkg	>SSSL	>ESV	Result	Qual	>Bkg	>SSSL	>ESV
Metals																			
Aluminum	mg/kg	16306	7.80E+03	5.00E+01	6.34E+03				YES	1.17E+04			YES	YES	1.18E+04			YES	YES
Arsenic	mg/kg	13.73	4.26E-01	1.00E+01	1.30E+00	B		YES		6.30E+00			YES		5.00E+00			YES	
Barium	mg/kg	123.94	5.47E+02	1.65E+02	4.65E+01					1.01E+02					6.53E+01				
Beryllium	mg/kg	0.8	9.60E+00	1.10E+00	8.10E-01		YES			1.20E+00		YES		YES	4.60E-01	J			
Calcium	mg/kg	1723	NA	NA	2.46E+04	J	YES			3.19E+03	J	YES			3.71E+02	J			
Chromium	mg/kg	37.04	2.32E+01	4.00E-01	7.60E+00	J			YES	1.71E+01	J			YES	1.67E+01	J			YES
Cobalt	mg/kg	15.15	4.68E+02	2.00E+01	1.30E+00	J				2.39E+01		YES		YES	3.80E+00	J			
Copper	mg/kg	12.71	3.13E+02	4.00E+01	6.50E+00					4.51E+01		YES		YES	2.08E+01		YES		
Iron	mg/kg	34154	2.34E+03	2.00E+02	4.37E+03			YES	YES	3.05E+04			YES	YES	2.75E+04			YES	YES
Lead	mg/kg	40.05	4.00E+02	5.00E+01	1.08E+01					2.60E+01					1.15E+01				
Magnesium	mg/kg	1033	NA	440000	7.90E+03	J	YES			6.03E+03	J	YES			1.13E+03	J	YES		
Manganese	mg/kg	1579	3.63E+02	1.00E+02	2.09E+02				YES	3.63E+02				YES	1.54E+01				
Mercury	mg/kg	0.08	2.33E+00	1.00E-01	2.60E-02	J				4.10E-02	J				1.70E-02	J			
Nickel	mg/kg	10.33	1.54E+02	3.00E+01	3.30E+00	J				4.58E+01		YES		YES	8.00E+00				
Potassium	mg/kg	799.76	NA	NA	5.31E+02	J				4.57E+02	J				4.04E+02	J			
Selenium	mg/kg	0.48	3.91E+01	8.10E-01	ND					1.60E+00		YES		YES	1.40E+00		YES		YES
Sodium	mg/kg	634.28	NA	NA	1.40E+02	B				8.37E+01	B				1.23E+02	B			
Vanadium	mg/kg	58.84	5.31E+01	2.00E+00	9.40E+00				YES	2.45E+01				YES	2.87E+01				YES
Zinc	mg/kg	40.64	2.34E+03	5.00E+01	1.61E+01					1.00E+02		YES		YES	2.16E+01				
Volatile Organic Compounds																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	5.80E-03	J				ND					ND				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	4.60E-02	B				1.50E-01	J				2.50E-02	B			
Bromomethane	mg/kg	NA	1.09E+01	NA	3.00E-03	B				3.10E-03	B				3.20E-03	B			
Carbon disulfide	mg/kg	NA	7.77E+02	9.00E-02	1.70E-03	J				ND					ND				
Methylene chloride	mg/kg	NA	4.66E+02	2.00E+00	3.30E-03	B				2.80E-03	B				3.40E-03	B			
Toluene	mg/kg	NA	1.55E+03	5.00E-02	2.00E-03	J				ND					ND				
Semivolatile Organic Compound																			
Anthracene	mg/kg	#####	2.33E+03	1.00E-01	7.90E-02	J				ND					ND				
Benzo(a)anthracene	mg/kg	#####	8.51E-01	5.21E+00	7.30E-01					4.10E-02	J				ND				
Benzo(a)pyrene	mg/kg	#####	8.51E-02	1.00E-01	1.60E+00			YES	YES	ND					ND				
Benzo(b)fluoranthene	mg/kg	#####	8.51E-01	5.98E+01	2.10E+00			YES		6.70E-02	J				ND				
Benzo(ghi)perylene	mg/kg	#####	2.32E+02	1.19E+02	1.10E+00					ND					ND				
Benzo(k)fluoranthene	mg/kg	#####	8.51E+00	1.48E+02	6.10E-01					ND					ND				
Chrysene	mg/kg	#####	8.61E+01	4.73E+00	9.40E-01					4.00E-02	J				ND				
Dibenz(a,h)anthracene	mg/kg	9.90E-01	8.61E-02	1.84E+01	2.70E-01	J		YES		ND					ND				
Fluoranthene	mg/kg	#####	3.09E+02	1.00E-01	1.10E+00				YES	8.10E-02	J				ND				
Indeno(1,2,3-cd)pyrene	mg/kg	#####	8.51E-01	1.09E+02	1.20E+00	J		YES		ND					ND				
Phenanthrene	mg/kg	#####	2.32E+03	1.00E-01	1.80E-01	J			YES	ND					ND				
Pyrene	mg/kg	#####	2.33E+02	1.00E-01	1.10E+00				YES	6.50E-02	J				ND				
Chlorinated Pesticides																			
Aldrin	mg/kg	NA	3.65E-02	2.50E-03	ND					ND					1.00E-03	J			
Endrin	mg/kg	NA	2.32E+00	1.00E-03	5.20E-03	J			YES	ND					ND				
Methoxychlor	mg/kg	NA	3.89E+01	1.99E-02	1.20E-02	J				ND					ND				

Analyses performed by Quanterra Environmental Services using U.S.EPA SW-846 analytical methods, including Update III methods where applicable.

<sup>a</sup> Bkg - Background. Concentration listed is two times (2x) the arithmetic mean of background metals concentration given in Science Applications International Corporation (1998) *Final Background Metals Survey Report, Fort McClellan, Alabama, July*.

<sup>b</sup> Residential human health site-specific screening level (SSSL) and ecological screening value (ESV) as given in IT Corporation (2000), *Draft Human Health and Ecological Screening Values and PAH Background Summary Report, Fort McClellan, Calhoun County, Alabama, March*.

B = Analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero).

J = Result is greater than stated method detection limit but less than or equal to specified reporting limit.

mg/kg = Milligrams per kilogram.

NA - Not Available.

ND - Not Detected.

Qual - Data Validation Qualifier.

Table 2-2

**Summary of Subsurface Soil Analytical Results**  
**Site Investigation, 1999**  
**Small Weapons Repair Shop, Parcel 66(7)**  
**Fort McClellan, Calhoun County, Alabama**

Parcel Number Sample Location Sample Number Sample Date Sample Depth (ft)				PPMP-75 PPMP-75-GP01 KJ0004 18-Jan-99 5-7				PPMP-75 PPMP-75-GP02 KJ0006 18-Jan-99 3-5				PPMP-75 PPMP-75-GP03 KJ0008 18-Jan-99 3-5			
Parameter	Units	Bkg <sup>a</sup>	SSSL <sup>b</sup>	Result	Qual	>Bkg	>SSSL	Result	Qual	>Bkg	>SSSL	Result	Qual	>Bkg	>SSSL
<b>Metals</b>															
Aluminum	mg/kg	#####	7.80E+03	1.31E+04			YES	1.30E+04			YES	1.49E+04		YES	YES
Arsenic	mg/kg	#####	4.26E-01	2.60E+00			YES	4.40E+00			YES	4.90E+00			YES
Barium	mg/kg	#####	5.47E+02	1.73E+02				8.57E+01				8.54E+01			
Beryllium	mg/kg	8.60E-01	9.60E+00	1.30E+00		YES		1.80E+00		YES		2.00E+00		YES	
Calcium	mg/kg	#####	NA	1.45E+03	J	YES		1.02E+03	J	YES		8.94E+02	J	YES	
Chromium	mg/kg	#####	2.32E+01	1.67E+01	J			1.81E+01	J			1.94E+01	J		
Cobalt	mg/kg	#####	4.68E+02	1.11E+01				3.18E+01		YES		3.74E+01		YES	
Copper	mg/kg	#####	3.13E+02	1.76E+01				3.77E+01		YES		3.90E+01		YES	
Iron	mg/kg	#####	2.34E+03	2.36E+04			YES	3.06E+04			YES	3.46E+04			YES
Lead	mg/kg	#####	4.00E+02	1.18E+01				1.61E+01				1.89E+01			
Magnesium	mg/kg	#####	NA	3.33E+03	J	YES		6.72E+03	J	YES		7.50E+03	J	YES	
Manganese	mg/kg	#####	3.63E+02	1.32E+02				3.12E+02				1.79E+02			
Mercury	mg/kg	7.00E-02	2.33E+00	1.90E-02	J			5.40E-02	J			3.20E-02	J		
Nickel	mg/kg	#####	1.54E+02	2.18E+01		YES		7.18E+01		YES		6.99E+01		YES	
Potassium	mg/kg	#####	NA	4.93E+02	J			4.20E+02	J			3.80E+02	J		
Selenium	mg/kg	4.70E-01	3.91E+01	1.00E+00		YES		1.50E+00		YES		1.60E+00		YES	
Sodium	mg/kg	#####	NA	1.95E+02	B			9.23E+01	B			1.25E+02	B		
Thallium	mg/kg	#####	5.08E-01	4.30E-01	J			6.10E-01	J		YES	ND			
Vanadium	mg/kg	#####	5.31E+01	2.10E+01				1.83E+01				1.84E+01			
Zinc	mg/kg	#####	2.34E+03	4.11E+01		YES		1.04E+02		YES		1.11E+02		YES	
<b>Volatiles</b>															
2-Butanone	mg/kg	NA	4.66E+03	3.80E-03	J			ND				ND			
Acetone	mg/kg	NA	7.76E+02	2.70E-01	J			4.90E-02	B			1.90E-02	B		
Bromomethane	mg/kg	NA	1.09E+01	3.00E-03	B			3.10E-03	B			2.90E-03	B		
Methylene chloride	mg/kg	NA	8.41E+01	2.90E-03	B			2.50E-03	B			3.00E-03	B		
cis-1,2-Dichloroethene	mg/kg	NA	7.77E+01	1.80E-02				ND				ND			
trans-1,2-Dichloroethene	mg/kg	NA	1.55E+02	3.20E-03	J			ND				ND			
<b>Semivolatile Organic Compounds</b>															
bis(2-Ethylhexyl)phthalate	mg/kg	NA	4.52E+01	ND				ND				5.10E-02	B		

Analyses performed by Quanterra Environmental Services using U.S.EPA SW-846 analytical methods, including Update III methods where applicable.

<sup>a</sup> Bkg - Background. Concentration listed is two times (2x) the arithmetic mean of background metals concentration given in Science Applications International Corporation (1998).

*Final Background Metals Survey Report, Fort McClellan, Alabama, July*

B - Analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero).

<sup>b</sup> Residential human health site-specific screening level (SSSL) and ecological screening value (ESV) as given in IT Corporation (2000) *Draft Human Health and Ecological Screening Values and PAH Background Summary Report, Fort McClellan, Calhoun County, Alabama, March*.

B - Analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero)

ft - Foot.

J - Result is greater than stated method detection limit but less than or equal to specified reporting limit.

mg/kg - Milligrams per kilogram.

NA - Not Available.

ND - Not detected.

Qual - Data validation qualifier.

Table 2-3

**Summary of Groundwater Analytical Results**  
**Site Investigation, 1999**  
**Small Weapons Repair Shop, Parcel 66(7)**  
**Fort McClellan, Calhoun County, Alabama**

Parcel Number Sample Location Sample Number Sample Date				PPMP-75 PPMP-75-GP01 KJ3001 24-Feb-99				PPMP-75 PPMP-75-GP02 KJ3002 24-Feb-99				PPMP-75 PPMP-75-GP03 KJ3003 24-Feb-99			
Parameter	Units	Bkg <sup>a</sup>	SSSL <sup>b</sup>	Result	Qual	>Bkg	>SSSL	Result	Qual	>Bkg	>SSSL	Result	Qual	>Bkg	>SSSL
<b>Metals</b>															
Aluminum	mg/L	2.34E+00	1.56E+00	1.02E-01	J			7.57E-02	J			1.39E+00			
Barium	mg/L	1.27E-01	1.10E-01	8.02E-02	J			2.10E-02	J			3.15E-02	J		
Calcium	mg/L	5.65E+01	NA	1.21E+02		YES		3.24E+01				2.71E+02		YES	
Iron	mg/L	7.04E+00	4.69E-01	1.22E+00			YES	ND				1.83E+00			YES
Magnesium	mg/L	2.13E+01	NA	6.81E+01		YES		2.19E+01		YES		1.54E+02		YES	
Manganese	mg/L	5.81E-01	7.35E-02	1.15E+00		YES	YES	5.46E-02				3.95E-01			YES
Nickel	mg/L	NA	3.13E-02	ND				ND				1.25E-02	J		
Potassium	mg/L	7.20E+00	NA	3.81E+00	J			2.42E+00	J			1.23E+01		YES	
Sodium	mg/L	1.48E+01	NA	1.09E+02		YES		2.65E+01		YES		1.67E+02		YES	
<b>Volatiles</b>															
1,1,1-Trichloroethane	mg/L	NA	3.05E-01	5.00E-04	J			ND				ND			
1,1-Dichloroethane	mg/L	NA	1.54E-01	6.90E-03				ND				ND			
1,1-Dichloroethene	mg/L	NA	9.00E-05	1.80E-03			YES	ND				ND			
Trichloroethene	mg/L	NA	4.50E-03	4.40E-03				ND				ND			
Vinyl chloride	mg/L	NA	3.00E-05	3.70E-02			YES	ND				ND			
cis-1,2-Dichloroethene	mg/L	NA	1.55E-02	2.10E-02			YES	ND				ND			
trans-1,2-Dichloroethene	mg/L	NA	3.07E-02	1.50E-02				ND				ND			

Analyses performed by Quanterra Environmental Services using U.S. Environmental Protection Agency SW-846 analytical methods, including Update III methods where applicable.

<sup>a</sup> Bkg - Background. Concentration listed is two times (2x) the arithmetic mean of background metals concentration given in Science Applications International Corporation (1998), *Final Background Metals Survey Report, Fort McClellan, Alabama, July*.

<sup>b</sup> Residential human health site-specific screening level (SSSL) as given in IT Corporation (2000), *Draft Human Health and Ecological Screening Values and PAH Background Summary Report, Fort McClellan, Calhoun County, Alabama, March*.

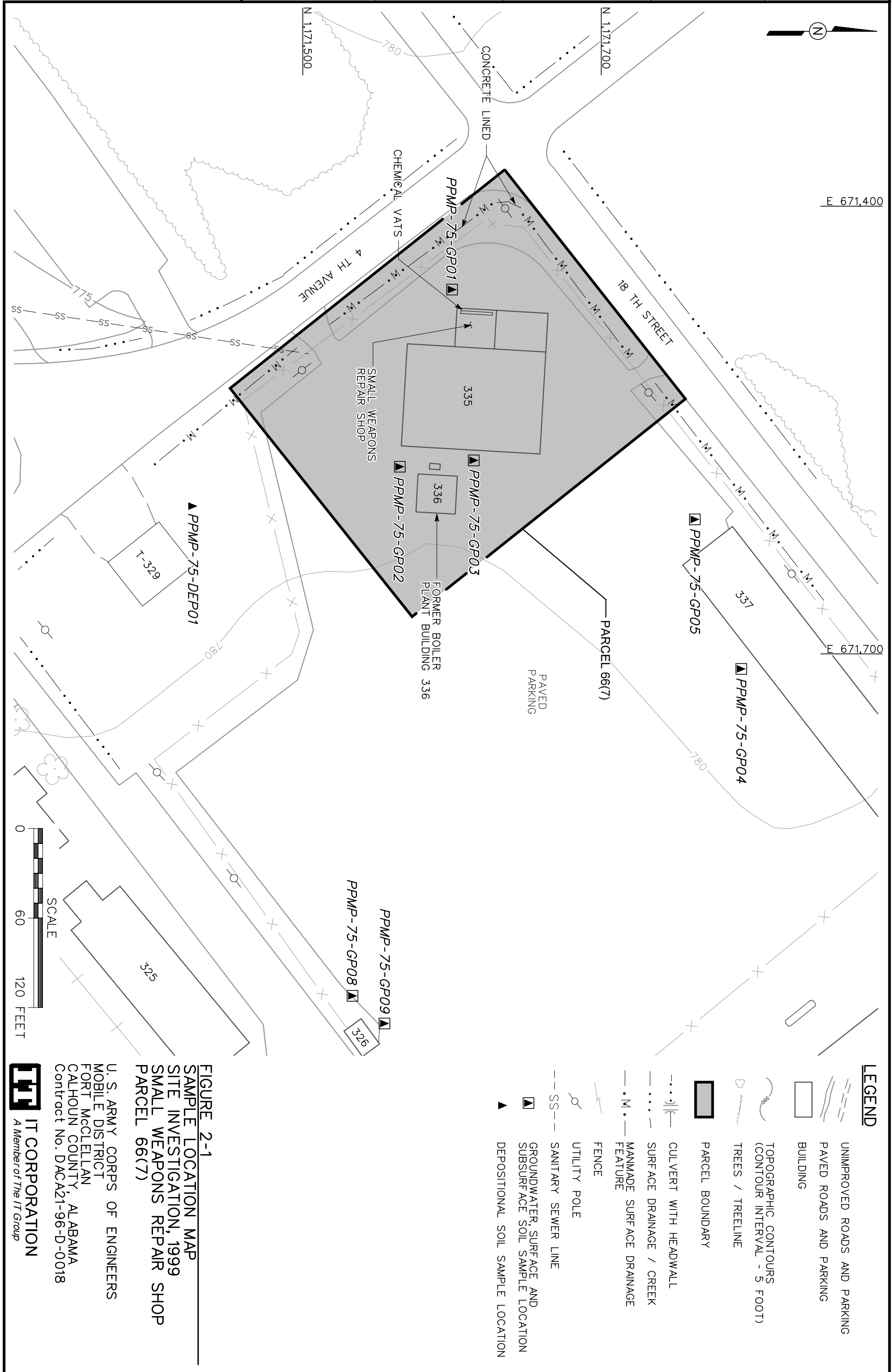
J - Result is greater than stated method detection limit but less than or equal to specified reporting limit.

mg/L - Milligrams per liter.

NA - Not Available.

ND - Not Detected.

Qual - Data Validation Qualifier.



### **2.1.2 Subsurface Soil Sampling**

Subsurface soil samples were collected from three soil borings at the Small Weapons Repair Shop (Parcel 66 [7]), as shown on Figure 2-1. As shown on Table 2-2, three metals, including aluminum, arsenic, and iron, were detected at concentrations exceeding the residential human health SSSLs. With the exception of aluminum at sample location PPMP-75-GP03, the concentrations of these metals were within background concentrations. Sample locations with analytical results exceeding SSSLs and background concentrations are shown on Figure 2-2.

### **2.1.3 Groundwater Sampling**

Three temporary wells PPMP-75-GP01, PPMP-75-GP02, and PPMP-75-GP03 were installed in the residuum groundwater zone at the Small Weapons Repair Shop. Analytical results were compared to the residential human health SSSLs and background screening values. As shown on Table 2-3, two metals and three VOCs exceeded the human health SSSLs. Groundwater samples exceeding the SSSLs are presented on Figure 2-2.

**Metals.** The concentrations of two metals (iron and manganese) exceeded residential human health SSSLs at temporary wells PPMP-75-GP01 and PPMP-75-GP03. The concentration of manganese exceeded the background concentration at temporary well PPMP-75-GP01.

**Volatile Organic Compounds.** Three VOCs, 1,1-dichloroethene (0.0018 mg/L), cis-1,2-dichloroethene (0.021 mg/L), and vinyl chloride (0.037 mg/L) were detected at concentrations exceeding residential human health SSSLs. All three VOCs were detected at temporary well location PPMP-75-GP01.

### **2.1.4 Water Level Measurements**

The depth to groundwater was measured in the three temporary wells installed at the Small Weapons Repair Shop, Parcel 66(7), following procedures outlined in Section 4.18 of the SAP (IT, 2000). Water levels from temporary wells at adjacent parcels were also measured to establish groundwater elevations across the entire area. Depth to groundwater was measured with an electronic water level meter. The meter probe and cable were cleaned between use at each temporary and permanent well location following decontamination methodology presented in Section 4.10 of the SAP (IT, 2000). Measurements were referenced to the top of the polyvinyl chloride (PVC) stickup. A summary of groundwater level measurements is presented in Table 1-1. A groundwater elevation map constructed from March 13 and 14, 2000 data is presented as Figure 1-3.

Based on topography and groundwater elevations shown on Figure 1-3, regional groundwater





flows towards the Small Weapons Repair Shop Parcel 66(7) from the east and from the west. The groundwater flow is controlled by a topographic high west of the site. The opposing groundwater flow directions have created a groundwater divide in the general vicinity of Building 335, diverting the local groundwater to the southwest towards Cane Creek.

## **3.0 Proposed Field Activities**

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### **3.1 Utility Clearances**

A utility clearance will be performed at all locations where groundwater samples will be collected, using the procedure outlined in Section 4.2.6 of the SAP (IT, 2000). The site manager will mark the proposed locations with stakes, coordinate with local utility companies to clear the proposed locations for utilities, and obtain digging permits. Once the locations are approved for intrusive sampling, the stakes will be labeled as cleared.

### **3.2 Environmental Sampling**

The environmental sampling program during the RI at the Small Weapons Repair Shop, Parcel 66(7), includes the installation and sampling of 13 monitoring wells. Groundwater samples will be collected from the proposed wells to provide data in order to determine the horizontal and vertical extent of groundwater contamination.

### **3.3 Residuum Monitoring Wells**

Residuum monitoring well boreholes will be drilled and installed using 4.25-inch inside diameter (ID) hollow-stem augers. Residuum monitoring wells will be drilled a minimum of 10 feet below the first groundwater bearing zone or to the top of bedrock, whichever is encountered first. The monitoring well casing will consist of new 2-inch ID, Schedule 40, threaded, flush-joint, PVC pipe. Attached to the bottom of the well casing will be a section of new threaded, flush-joint, 0.010-inch continuous wrap PVC well screen, approximately 10 to 20 feet long. The proposed residuum monitoring well locations are shown on Figure 3-1. The exact monitoring well locations will be determined in the field by the on-site geologist based on actual field conditions.

Soil samples will be collected at 5-foot intervals to the total depth of the hole during hollow-stem auger drilling. Samples will be collected using a 24-inch long, 2-inch diameter or-larger-diameter split-spoon samplers. Lithologic samples will be collected for all monitoring wells during drilling to provide a detailed lithologic log. Soil borings will be logged in accordance with American Society for Testing and Materials Method D 2488 using the Unified Soil Classification System. The residuum monitoring wells will be drilled, installed and developed as specified in Section 4.8 and Appendix C of the SAP (IT, 2000). Groundwater samples will not



be collected from residuum wells for a period of at least 14 days after well development. The proposed residuum monitoring well rationale is presented in Table 3-1.

### **3.4 Bedrock Monitoring Wells**

Six bedrock monitoring wells will be installed using a combination of hollow stem auger and air rotary drilling techniques at the small weapon repair shop, Parcel 66(7). The proposed bedrock monitoring well locations are shown on Figure 3-1.

An air rotary rig with a 12-inch percussion bit or rotary bit will be used to drill the borehole from land surface to 10 feet into bedrock. The borehole diameter will be approximately 12 inches, such that a 10-inch ID carbon steel International Pipe Standard outer casing will be installed into the borehole from land surface to 5 feet into bedrock. A minimum of a 2-inch annular space between the outer casing and borehole wall will be required. The 10-inch carbon steel outer casing will be grouted in-place using a tremie pipe suspended in the annulus outside of the casing. Bentonite-cement grout will be mixed using approximately 6.5 to 7 gallons of water, and 5 pounds of bentonite per 94 pound bag of Type I Portland cement. After the grout has cured a minimum of 48 hours, an HQ wireline core barrel will be used to collect core samples continuously from the bottom of the outer casing to a minimum of 20 feet into bedrock. The hole depth into bedrock will be increased if groundwater is not encountered. After completion of core sample collection, an 8-inch air percussion bit will be used to ream the hole a minimum of 15 feet below the bottom of the outer casing and into bedrock. The compressor on the drill rig will be equipped with an air filter between the compressor and the drill bit. Water will be the only lubricant allowed during drilling operations.

Four-inch monitoring wells will be installed inside the outer casing at each proposed well location. The well casing will consist of new, 4-inch ID, Schedule 40, threaded, flush-joint, PVC pipe. Attached to the bottom of the well casing will be a section of new threaded, flush joint 0.010-inch continuous wrap PVC well screen, approximately 10 to 20 feet long. Attached to the bottom of the screen will be a sump, approximately 3 to 5 feet long, composed of new, 4-inch ID, Schedule 40, threaded, flush-joint PVC pipe. After the casing and screen materials are lowered into the boring, a gravel pack will be installed around the well screen and the inside casing will be grouted from the top of the gravel pack to land surface. The gravel pack will consist of 20/40 silica sand and will be tremied into place from the bottom of the sump to approximately 5 feet above the top of the screen. A bentonite seal approximately 5 feet thick will be placed above the

Table 3-1

**Site Sampling Rationale, Remedial Investigation  
Small Weapons Repair Shop, Parcel 66(7)  
Fort McClellan, Calhoun County, Alabama**

Sample Location	Sample Media	Sampling Location Rationale
PPMP-66-MW01	GROUNDWATER	Residuum groundwater monitoring well PPMP-66-MW01 will be installed approximately 100 feet upgradient of temporary monitoring well PPMP-75-GP01 to provide groundwater quality data and to determine whether the organic compounds detected in temporary monitoring well PPMP-75-GP01 during SI activities are from sources other than the Small Weapons Repair Shop.
PPMP-66-MW02	GROUNDWATER	Residuum groundwater monitoring well PPMP-66-MW02 will replace temporary well PPMP-75-GP01 located on the southwest corner of the Small Weapons Repair Shop. It is estimated that the monitoring well will be installed to a depth of approximately 14 feet below ground surface. Groundwater samples will be collected from the well to determine the presence or absence of volatile organic compounds. Current and previous data will be compared and groundwater quality assessed.
PPMP-66-MW03	GROUNDWATER	Residuum groundwater monitoring well PPMP-66-MW03 will be installed approximately 150 feet south and potentially downgradient of the Small Weapons Repair Shop to provide groundwater quality data, groundwater elevations to establish groundwater flow direction, vertical gradient, and to determine the lateral extent of groundwater contamination. Groundwater samples collected from the monitoring well will be analyzed for volatile organic compounds.
PPMP-66-MW04	GROUNDWATER	Residuum groundwater monitoring well PPMP-66-MW04 will be installed approximately 180 feet north of the Small Weapons Repair Shop to provide groundwater quality data, groundwater elevations to establish groundwater flow direction, vertical gradient, and to determine the lateral extent of groundwater contamination. Groundwater samples collected from the monitoring well will be analyzed for volatile organic compounds.
PPMP-66-MW05	GROUNDWATER	Residuum groundwater monitoring well PPMP-66-MW05 will be installed approximately 90 feet northeast of temporary monitoring well PPMP-75-GP01 to provide groundwater quality data, groundwater elevations to establish groundwater flow direction, vertical gradient, and to determine the lateral extent of groundwater contamination. Groundwater samples collected from the monitoring well will be analyzed for volatile organic compounds.
PPMP-66-MW06	GROUNDWATER	Residuum monitoring well PPMP-66-MW06 will be installed approximately 90 feet southeast of temporary monitoring well PPMP-75-GP01 to provide groundwater quality data, groundwater elevations to establish groundwater flow direction, vertical gradient, and to determine the lateral extent of groundwater contamination. Groundwater samples collected from the monitoring well will be analyzed for volatile organic compounds.
PPMP-66-MW07	GROUNDWATER	Residuum monitoring well PPMP-66-MW07 will be installed approximately 120 feet northeast and potentially downgradient of temporary monitoring well PPMP-75-GP01 to provide groundwater quality data, groundwater elevations to establish groundwater flow direction, vertical gradient, and to determine the lateral extent of groundwater contamination. Groundwater samples collected from the monitoring well will be analyzed for volatile organic compounds.
PPMP-66-MW08	GROUNDWATER	Bedrock groundwater monitoring well PPMP-66-MW08 will be installed adjacent to residuum with monitoring well PPMP-66-MW02 to provide groundwater quality data, groundwater elevations to establish groundwater flow direction, vertical gradient, and to determine the vertical extent of groundwater contamination. It is estimated that the monitoring well will be installed to a maximum depth of approximately 75 feet below ground surface. Groundwater samples collected from the monitoring well will be analyzed for volatile organic compounds.
PPMP-66-MW09	GROUNDWATER	Bedrock groundwater monitoring well PPMP-66-MW09 will be installed adjacent to residuum monitoring well PPMP-66-MW03 to provide groundwater quality data, groundwater elevations to establish groundwater flow direction, vertical gradient, and to determine the vertical extent of groundwater contamination. It is estimated that the monitoring well will be installed to a maximum depth of approximately 75 feet below ground surface. Groundwater samples collected from the monitoring well will be analyzed for volatile organic compounds.
PPMP-66-MW10	GROUNDWATER	Bedrock groundwater monitoring well PPMP-66-MW10 will be installed adjacent to residuum monitoring well PPMP-66-MW04 to provide groundwater quality data, groundwater elevations to establish groundwater flow direction, vertical gradient, and to determine the vertical extent of groundwater contamination. It is estimated that the monitoring well will be installed to a maximum depth of approximately 75 feet below ground surface. Groundwater samples collected from the monitoring well will be analyzed for volatile organic compounds.
PPMP-66-MW11	GROUNDWATER	Bedrock groundwater monitoring well PPMP-66-MW11 will be installed adjacent to residuum monitoring well PPMP-66-MW05 to provide groundwater quality data, groundwater elevations to establish groundwater flow direction, vertical gradient, and to determine the vertical extent of groundwater contamination. It is estimated that the monitoring well will be installed to a maximum depth of approximately 75 feet below ground surface. Groundwater samples collected from the monitoring well will be analyzed for volatile organic compounds, semivolatile compounds, and explosives.
PPMP-66-MW12	GROUNDWATER	Bedrock groundwater monitoring well PPMP-66-MW12 will be installed adjacent to residuum monitoring well PPMP-66-MW06 to provide groundwater quality data, groundwater elevations to establish groundwater flow direction, vertical gradient, and to determine the vertical extent of groundwater contamination. It is estimated that the monitoring well will be installed to a maximum depth of approximately 75 feet below ground surface. Groundwater samples collected from the monitoring well will be analyzed for volatile organic compounds, semivolatile compounds, and explosives.
PPMP-66-MW13	GROUNDWATER	Bedrock groundwater monitoring well PPMP-66-MW13 will be installed adjacent to residuum monitoring well PPMP-66-MW07 to provide groundwater quality data, groundwater elevations to establish groundwater flow direction, vertical gradient, and to determine the vertical extent of groundwater contamination. It is estimated that the monitoring well will be installed to a maximum depth of approximately 75 feet below ground surface. Groundwater samples collected from the monitoring well will be analyzed for volatile organic compounds.

gravel pack. The remaining annular space will be grouted with a bentonite-cement mixture (described above) and tremied in place with a side discharge tremie from the top of the bentonite seal to ground surface. The bedrock monitoring wells will be drilled, installed, and developed as specified in Section 4.8 and Appendix C of the SAP (IT, 2000). Groundwater samples will not be collected from bedrock wells for a period of at least 14 days after well development. The proposed bedrock monitoring well rationale is presented in Table 3-1.

### **3.5 Groundwater Sampling**

Thirteen groundwater samples will be collected from the proposed permanent monitoring wells at the Small Weapons Repair Shop, Parcel 66(7), to determine the nature and extent of VOCs in the groundwater.

Groundwater samples will be collected from the residuum and bedrock wells installed at the site. Groundwater sampling rationale is presented in Table 3-1. The groundwater sample designations and required quality assurance/quality control sample quantities are listed in Table 3-2.

Groundwater samples will be collected in accordance with the procedures outlined in the SAP (IT, 2000).

### **3.6 Temporary Well Abandonment**

Temporary monitoring wells PPMP-75-GP01, PPMP-75-GP02 and PPMP-75-GP03 constructed of 2-inch diameter PVC will be abandoned per Alabama Department of Environmental Management guidelines. The wells will be abandoned by removing the PVC pipe casing and screen. After the casing and screen are removed, the borehole will then be grouted from the bottom of the borehole to approximately 6 inches below ground surface. If the screen and casing cannot be removed, the PVC pipe and screen will be abandoned by pressure grouting the inside of the casing. Upon completion of abandonment operations, the area surrounding the wells will be patched using concrete.

### **3.7 Slug Tests**

The hydraulic conductivity of the geologic material underlying the Small Weapons Repair Shop, Parcel 66(7), site will be estimated by performing slug tests in three permanent monitoring wells. Rising head (slug out) and/or falling head (slug in) tests will be conducted and drawdown measurements taken with a pressure transducer and data logger from selected monitoring wells.

**Table 3-2**

**Groundwater Sample Designations and QA/QC Sample Quantities  
Small Weapons Repair Shop, Parcel 66(7)  
Fort McClellan, Calhoun County, Alabama**

Sample Location	Sample Designation	Sample Depth (ft)	QA/QC Samples			Analytical Suite
			Field Duplicates	Field Splits	MS/MSD	
PPMP-66-MW01	PPMP-66-MW01-GW-HN3001-REG	a				TCL VOCs
PPMP-66-MW02	PPMP-66-MW02-GW-HN3002-REG	a	PPMP-66-MW02-GW-HN3003-FD	PPMP-66-MW02-GW-HN3004-FS		TCL VOCs
PPMP-66-MW03	PPMP-66-MW03-GW-HN3005-REG	a				TCL VOCs
PPMP-66-MW04	PPMP-66-MW04-GW-HN3006-REG	a			PPMP-66-MW04-GW-HN3006-MS/MSD	TCL VOCs
PPMP-66-MW05	PPMP-66-MW05-GW-HN3007-REG	a				TCL VOCs
PPMP-66-MW06	PPMP-66-MW06-GW-HN3008-REG	a				TCL VOCs
PPMP-66-MW07	PPMP-66-MW07-GW-HN3009-REG	a				TCL VOCs
PPMP-66-MW08	PPMP-66-MW08-GW-HN3010-REG	a				TCL VOCs
PPMP-66-MW09	PPMP-66-MW09-GW-HN3011-REG	a				TCL VOCs
PPMP-66-MW10	PPMP-66-MW10-GW-HN3012-REG	a				TCL VOCs
PPMP-66-MW11	PPMP-66-MW10-GW-HN3013-REG	a				TCL VOCs
PPMP-66-MW12	PPMP-66-MW10-GW-HN3014-REG	a				TCL VOCs
PPMP-66-MW13	PPMP-66-MW11-GW-HN3015-REG	a				TCL VOCs

<sup>a</sup> Actual sample depth selected for analysis will be at the discretion of the on-site geologist and will be based on field observation.

FD- Field duplicate.

FS-Field split.

QA/QC - Quality assurance/quality control.

MS/MSD - Matrix spike/matrix spike duplicate.

TCL - Target compound list.

VOC - Volatile organic compound.

Slug tests will be conducted in accordance with the procedures outlined in Section 4.16.1 of the SAP (IT, 2000).

### ***3.8 Surveying of Sample Locations***

Sampling locations will be marked with pin flags, stakes, and/or flagging and will be surveyed using either global positioning system (GPS) or conventional civil survey techniques, as necessary, to obtain the required level of accuracy. Horizontal coordinates will be referenced to the U.S. State Plane Coordinate System, Alabama East Zone, North American Datum 1983. Elevations will be referenced to the National Geodetic Vertical Datum of 1929 or the North American Vertical Datum of 1988 (soon to be established on site).

Horizontal coordinates will be recorded using a GPS to provide accuracy within 1 meter. Because of the need to use monitoring wells to determine water levels, a higher level of accuracy is required. Monitoring wells will be surveyed to an accuracy of 0.1 foot for horizontal coordinates and 0.01 foot for elevations, using survey-grade GPS techniques and/or conventional civil survey techniques, as required. Procedures to be used for GPS surveying are described in Section 4.3 of the SAP. Conventional land survey requirements are presented in Section 4.19 of the SAP (IT, 2000).

### ***3.9 Investigation-Derived Waste Management***

Management and disposal of the investigation-derived wastes (IDW) will follow procedures and requirements as described in Appendix D of the SAP (IT, 2000). The IDW expected to be generated at the Small Weapons Repair Shop site will include purge water from permanent monitoring well development and sampling activities, spent well materials, decontamination fluids, and disposable personal protective equipment. The IDW will be staged within the fenced area surrounding Buildings 335 and 336 while awaiting final disposal.

### ***3.10 Site-Specific Safety and Health***

Safety and health requirements for the RI are provided in the SSHP attachment for the Former Ordnance Motor Repair Area, Parcel 75(7). The SSHP attachment will be used in conjunction with the installation-wide safety and health plan.



## **4.0 Project Schedule**

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The project schedule for the supplemental RI activities will be provided by the IT project manager to the Base Realignment and Closure Cleanup Team on a monthly basis.

## 5.0 References

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Environmental Science and Engineering Inc., 1998, *Final Environmental Baseline Survey, Fort McClellan, Alabama*, prepared for U.S. Army Environmental Center, Aberdeen Proving Ground, Maryland, January.

IT Corporation (IT), 2000, *Final Installation-Wide Sampling and Analysis Plan, Fort McClellan, Calhoun County, Alabama*, March.

IT Corporation (IT), 1998a, *Final Site-Specific Field Sampling and Analysis Plan, Former Ordnance Motor Repair Area, Fort McClellan, Calhoun County, Alabama*, December.

IT Corporation (IT), 1998b, *Final Installation-Wide Work Plan, Fort McClellan, Calhoun County, Alabama*, August.

## **ATTACHMENT 1**

### **LIST OF ABBREVIATIONS AND ACRONYMS**

# List of Abbreviations and Acronyms

Abs	skin absorption
AC	hydrogen cyanide
AcB2	Anniston and Allen gravelly loams, 2 to 6 percent slopes, eroded
AcC2	Anniston and Allen gravelly loams, 6 to 10 percent slopes, eroded
AcD2	Anniston and Allen gravelly loams, 10 to 15 percent slopes, eroded
AcE2	Anniston and Allen gravelly loams, 15 to 25 percent slopes, eroded
ACGIH	American Conference of Governmental Industrial Hygienists
ADEM	Alabama Department of Environmental Management
AEL	airborne exposure limit
AL	Alabama
amb.	Amber
ANAD	Anniston Army Depot
APT	armor piercing tracer
ASP	Ammunition Supply Point
ASR	Archives Search Report, July 1999
AST	aboveground storage tank
ASTM	American Society for Testing and Materials
B	analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero)
BCT	BRAC Cleanup Team
BFB	bromofluorobenzene
bgs	below ground surface
bkg	background
bls	below land surface
BOD	biological oxygen demand
BRAC	Base Realignment and Closure
Braun	Braun Intertec Corporation
BTEX	benzene, toluene, ethylbenzene, and xylenes
BTOC	below top of casing
BZ	breathing zone
C	ceiling limit value
Ca	carcinogen
CCAL	continuing calibration
CCB	continuing calibration blank
CD	compact disc
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERFA	Community Environmental Response Facilitation Act
CESAS	Corps of Engineers South Atlantic Savannah
CFC	chlorofluorocarbon
CG	cyanogen chloride
ch	inorganic clays of high plasticity
CK	carbonyl chloride
cl	inorganic clays of low to medium plasticity
Cl.	chlorinated
CLP	Contract Laboratory Program
CN	chloroacetophenone
CNB	chloroacetophenone, benzene, and carbon tetrachloride
CNS	chloroacetophenone, chloropicrin, and chloroform
COC	chain of custody

COE	Corps of Engineers
Con	skin or eye contact
CRL	certified reporting limit
CRZ	contamination reduction zone
CS	ortho-chlorobenzylidene-malononitrile
CSEM	conceptual site exposure model
ctr.	container
CWA	chemical warfare agent
CWM	chemical warfare materials, clear wide mouth
CX	dichloroformoxime
D	duplicate
DANC	decontamination agent, non-corrosive
°C	degrees Celsius
°F	degrees Fahrenheit
DDT	dichlorodiphenyltrichloroethane
DEP	depositional soil
DI	deionized
DIMP	di-isopropylmethylphosphonate
DMMP	dimethylmethylphosphonate
DOD	U.S. Department of Defense
DP	direct-push
DPDO	Defense Property Disposal Office
DQO	data quality objective
DRMO	Defense Reutilization and Marketing Office
DS	deep (subsurface) soil
DS2	Decontamination Solution Number 2
E&E	Ecology and Environment, Inc.
EBS	environmental baseline survey
Elev.	elevation
EM	electromagnetic
EM31	Geonics Limited EM31 Terrain Conductivity Meter
EM61	Geonics Limited EM61 High-Resolution Metal Detector
EOD	explosive and ordnance disposal
EODT	explosive and ordnance disposal team
EPA	U.S. Environmental Protection Agency
EPC	exposure point concentration
EPIC	Environmental Photographic Interpretation Center
ER	equipment rinsate
ESE	Environmental Science and Engineering, Inc.
ESV	ecological screening value
E-W	east to west
EZ	exclusion zone
FB	field blank
FD	field duplicate
FedEx	Federal Express, Inc.
FFE	field flame expedient
Fil	filtered
Flt	filtered

FMP 1300	Former Motor Pool 1300 Site
Frtn	fraction
FS	field split
ft	feet
ft/ft	feet per foot
FTA	fire training area
FTMC	Fort McClellan
g	gram
G-856	Geometrics, Inc. G-856 magnetometer
G-858G	Geometrics, Inc. G-858G magnetic gradiometer
gal	gallon
gal/min	gallons per minute
GB	sarin
gc	clay gravels; gravel-sand-clay mixtures
GC	gas chromatograph
GC/MS	gas chromatograph/mass spectrometer
GFAA	graphite furnace atomic absorption
gm	silty gravels; gravel-sand-silt mixtures
gp	poorly graded gravels; gravel-sand mixtures
gpm	gallons per minute
GPR	ground-penetrating radar
GPS	global positioning system
GSBP	Ground Scar Boiler Plant
GSSI	Geophysical Survey Systems, Inc.
GW	groundwater
gw	well-graded gravels; gravel-sand mixtures
HA	hand auger
HCl	hydrochloric acid
HD	distilled mustard
HDPE	high-density polyethylene
Herb.	herbicides
HNO <sub>3</sub>	nitric acid
hr	hour
H&S	health and safety
HSA	hollow stem auger
HTRW	hazardous, toxic, and radioactive waste
I	out of control, data rejected due to low recovery
ICAL	initial calibration
ICB	initial calibration blank
ICP	inductively-coupled plasma
ICS	interference check sample
ID	inside diameter
IDL	instrument detection limit
IDLH	immediately dangerous to life or health
IDW	investigation-derived waste
IMPA	isopropylmethyl phosphonic acid
in.	inch
Ing	ingestion

**List of Abbreviations and Acronyms (Continued)**

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Inh	inhalation	ND	not detected	qty	quantity
IP	ionization potential	NE	no evidence	Qual	qualifier
IPS	International Pipe Standard	NFA	No Further Action	R	rejected
IRDMIS	Installation Restoration Data Management Information System	ng/L	nanograms per liter	RCRA	Resource Conservation and Recovery Act
IT	IT Corporation	NGVD	National Geodetic Vertical Datum	ReB3	Rarden silty clay loams
ITEMS	IT Environmental Management System <sup>TM</sup>	NIC	notice of intended change	REG	field sample
J	estimated concentration	NIOSH	National Institute for Occupational Safety and Health	REL	recommended exposure limit
JeB2	Jefferson gravelly fine sandy loam, 2 to 6 percent slopes, eroded	No.	number	RFA	request for analysis
JeC2	Jefferson gravelly fine sandy loam, 6 to 10 percent slopes, eroded	NOAA	National Oceanic and Atmospheric Administration	RI	remedial investigation
JfB	Jefferson stony fine sandy loam, 0 to 10 percent slopes have strong slopes	NR	not requested	RL	reporting limit
K	conductivity	ns	nanosecond	RPD	relative percent difference
L	lewisite; liter	N-S	north to south	RRF	relative response factor
LC <sub>50</sub>	lethal concentration for 50 percent of population tested	nT	nanotesla	RSD	relative standard deviation
LD <sub>50</sub>	lethal dose for 50 percent of population tested	NTU	nephelometric turbidity unit	RTK	real-time kinematic
l	liter	O&G	oil and grease	SAD	South Atlantic Division
LCS	laboratory control sample	OD	outside diameter	SAE	Society of Automotive Engineers
LEL	lower explosive limit	OE	ordnance and explosives	SAIC	Science Applications International Corporation
LT	less than the certified reporting limit	oh	organic clays of medium to high plasticity	SAP	installation-wide sampling and analysis plan
max	maximum	ol	organic silts and organic silty clays of low plasticity	sc	clayey sands; sand-clay mixtures
MDL	method detection limit	OP	organophosphorus	Sch.	schedule
mg/kg	milligrams per kilogram	OSHA	Occupational Safety and Health Administration	SD	sediment
mg/L	milligrams per liter	OWS	oil/water separator	SDG	sample delivery group
mg/m <sup>3</sup>	milligrams per cubic meter	oz	ounce	SDZ	safe distance zone
mh	inorganic silts, micaceous or diatomaceous fine, sandy or silt soils	PAH	polynuclear aromatic hydrocarbon	SEMS	Southern Environmental Management & Specialties
MHz	megahertz	Pb	lead	SFSP	site-specific field sampling plan
µg/g	micrograms per gram	PCB	polychlorinated biphenyl	SGF	standard grade fuels
µg/kg	micrograms per kilogram	PCE	perchlorethene	SHP	installation-wide safety and health plan
µg/L	micrograms per liter	PDS	Personnel Decontamination Station	SI	site investigation
µmhos/cm	micromhos per centimer	PEL	permissible exposure limit	sm	silty sands; sand-silt mixtures
min	minimum	Pest.	pesticide	SOP	standard operating procedure
MINICAMS	miniature continuous air sampling system	PG	professional geologist	sp	poorly graded sands; gravelly sands
ml	inorganic silts and very fine sands	PID	photoionization detector	SP	sump pump
mL	milliliter	PkA	Philo and Stendal soils local alluvium, 0 to 2 percent slopes	Ss	stony rough land, sandstone series
mm	millimeter	POL	petroleum, oils, and lubricants	SS	surface soil
MOGAS	motor vehicle gasoline	PP	peristaltic pump	SSC	site-specific chemical
MPA	methyl phosphonic acid	ppb	parts per billion	SSHO	site safety and health officer
MR	molasses residue	PPE	personal protective equipment	SSHP	site-specific safety and health plan
MS	matrix spike	ppm	parts per million	SSSL	site-specific screening level
mS/cm	milliSiemens per centimeter	PPMP	Print Plant Motor Pool	STB	supertropical bleach
MSD	matrix spike duplicate	ppt	parts per thousand	STEL	short-term exposure limit
msl	mean sea level	PSSC	potential site-specific chemical	STOLS	Surface Towed Ordnance Locator System <sup>®</sup>
MtD3	Montevallo shaly, silty clay loam, 10 to 40 percent slopes , severely eroded	pt	peat or other highly organic silts	Std. units	standard units
mV	millivolts	PVC	polyvinyl chloride	SU	standard unit
MW	monitoring well	QA	quality assurance	SVOC	semivolatile organic compound
N/A	not applicable; not available	QA/QC	quality assurance/quality control	SW	surface water
NAD	North American Datum	QAP	installation-wide quality assurance plan	SW-846	U.S. EPA <i>Test Methods for Evaluating Solid Waste: Physical/Chemical Methods</i>
NAD83	North American Datum of 1983	QC	quality control	SZ	support zone
NAVD88	North American Vertical Datum of 1988	QST	QST Environmental Inc.	TAL	target analyte list

**List of Abbreviations and Acronyms (Continued)**

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TAT	turn around time
TB	trip blank
TCE	trichloroethene
TCL	target compound list
TCLP	toxicity characteristic leaching procedure
TDGCL	thiodiglycol
TDGCLA	thiodiglycol chloroacetic acid
TERC	Total Environmental Restoration Contract
TIC	tentatively identified compounds
TLV	threshold limit value
TN	Tennessee
TOC	top of casing, total organic carbon
TPH	total petroleum hydrocarbons
TRADOC	U.S. Army Training and Doctrine Command
TRPH	total recoverable petroleum hydrocarbons
TWA	time weighted average
UCL	upper confidence limit
UCR	upper certified range
UJ	not detected above reporting limit; result should be estimated
USACE	U.S. Army Corps of Engineers
USAEC	U.S. Army Environmental Center
USAEHA	U.S. Army Environmental Hygiene Agency
USAMCLS	U.S. Army Chemical School
USATEU	U.S. Army Technical Escort Unit
USATHAMA	U.S. Army Toxic and Hazardous Material Agency
USCS	Unified Soil Classification System
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
UST	underground storage tank
UXO	unexploded ordnance
VOA	volatile organic analyte
VOC	volatile organic compound
VOH	volatile organic hydrocarbon
VQlfr	validation qualifier
VQual	validated qualifier
VX	nerve agent (O-ethyl-S- [diisopropylaminoethyl]-methylphosphonothiolate)
Weston	Roy F. Weston, Inc.
WP	installation-wide work plan
WS	watershed
WSA	Watershed Screening Assessment
WWI	World War I
WWII	World War II
XRF	x-ray fluorescence
yd <sup>3</sup>	cubic yards